Model 8910
Display/Power Supply

Operation and Service Manual

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Model 8910
Display/Power Supply

Operation and Service Manual

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Telex No. 6879024

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About this manual

The *Display/Power Supply Operation and Service Manual* tells you how to operate and maintain the MODEL 8910 Display/Power Supply. Read it thoroughly before using the instrument.

- Chapter 1 explains how to set up the Display/Power Supply and how to connect it to a transducer.
- Chapter 2 explains how to operate the Display/Power Supply.
- Chapter 3 covers maintenance and troubleshooting.

Step-by-step instructions are numbered in boldface type:

1, 2, 3, etc., set flush-left against the text margin.

To call your attention to an important note or comment, a black four-pointed star ✦ is used.

HELP!

To obtain technical assistance with this instrument or this manual, please call TSI's Industrial Test Instruments Group at 612/490-2888. If your unit needs repair, contact TSI's Customer Service department at 612/483-4711. ■

Introduction

The MODEL 8910 Display/Power Supply is a versatile power supply and readout module which generates +12 volts of direct current (DC) at 350 milliamperes to power a transducer and provide an LED readout of its output. The module is designed specifically to work with TSI air velocity transducers and mass flowmeters in order to provide you with a convenient readout of air velocity or mass flowrate. Essentially the Display/Power Supply supplies power to the transducer, accepts a signal of either 0 to 5 volts DC or 4 to 20 milliamperes (depending on the range you select) and displays an output that is linearly proportional to the signal.

If purchased with a TSI transducer or flowmeter, the Display/Power Supply has been set up at TSI to accurately display the calibrated velocity or flowrate. However, you can adjust the module's full-scale setting as well as its engineering units of measure to meet your specific needs. This flexibility allows the Display/Power Supply to be used for many different kinds of transducers. ■

Chapter 1
Setup

The Display/Power Supply is easy to set up. First use the components list (table 1) to make sure no items are missing; then, identify all the parts in the labelled photographs (figs. 2 and 3). Next follow the setup instructions to prepare the instrument for operation.

Unpacking

Table 1 lists the items included with the Display/Power Supply; if any are missing or damaged, notify TSI immediately.

TABLE 1. List of components

Qty	Item	Part No.	
1	Display/Power Supply	8910	(115 volts) or
		8910-1	(220 volts)
1	Power cord	1303053	(115 volts) or
		1303055	(220 volts)
1	Connector	1302675	
1	Connector cover	2919014	
1	6-foot transducer cable	800211	
1	Operation and Service Manual	1980031	
1	Sheet labels (measurement units)	2404264	

Note the registration card at the front of this manual. Please complete it and mail promptly. This allows TSI to inform you of product updates.

Figure 1. Display/Power Supply and accessories

Identifying the parts

Figures 2 and 3 show the seven main parts of the Display/Power Supply. Become familiar with them before continuing the setup procedure.

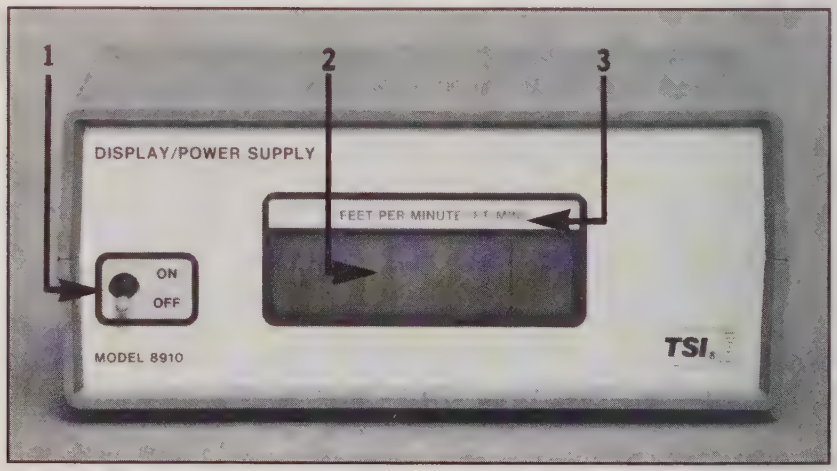

Figure 2. Front of the Display/Power Supply

1. on/off switch
2. display
3. display units

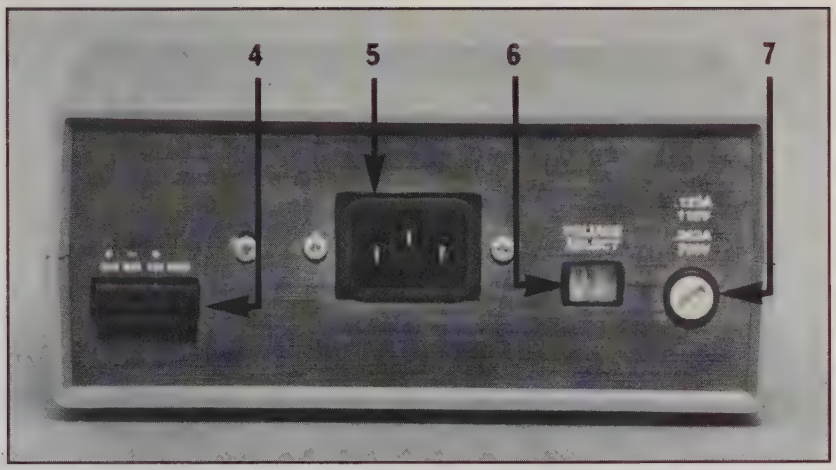

Figure 3. Back of the Display/Power Supply

4. signal input and power-supply output receptacle
5. AC power cord connector
6. voltage selector
7. fuse

Connecting the Display/Power Supply to a TSI transducer

The Display/Power Supply has a 4-pin receptacle for signal input and power-supply output; the receptacle is located on the back of the module. A cable assembly is also provided; it connects the Display/Power Supply to a TSI air velocity transducer or to a TSI linearized mass flowmeter. The cable assembly has the same connector on each end. Plug one of the connectors into the single receptacle labelled:

+ SIG − SIG + 12V GND

Plug the other connector into the receptacle on the back of the TSI transducer or flowmeter. Now plug the Display/Power Supply's power cord into the AC receptacle on the back of the unit and then into an AC outlet.

Caution: Before you plug your unit into a power source make sure that: (a) the Voltage Select switch displays your present operating voltage, either 115 volts or 230 volts; (b) the installed fuse matches the voltage rating. If you are operating at 115 volts, install a 0.125-ampere fuse; if you operating at 220 volts, install a 0.063-ampere fuse.

If you are operating a TSI transducer or flowmeter, the Display/Power Supply is now ready for operation.

Fabricating and connecting your own transducer cables

If you plan to use the Display/Power Supply in conjunction with an instrument other than a TSI transducer, you must assemble and connect a transducer cable and set up the module's readout scale for the appropriate measurement units. The Display/Power Supply is supplied with a 6-foot connecting cable to connect the module to a TSI transducer or flowmeter. Longer cables are available from TSI. If you plan to make your own cable, or if you plan to connect the Display/Power Supply to another type of transducer, follow these seven steps:

1 Use 4-conductor cable of at least 18 gauge. To help reduce noise, shielded cable is recommended for runs longer than 20 feet. Cable lengths of more than 500 feet are not recommended.

2 Locate the extra connector and connector cover provided with the Display/Power Supply.

3 Slide the connector cover onto your cable or wire bundle (fig. 4).

Figure 4. Connector cover and cable ready for step 5

4 Strip ¼-inch of insulation from the end of each wire.

5 Wire the connector according to the label on the connector. To hold the wire in the connector, insert the stripped end of the wire into the proper slot. Turn the corresponding screw clockwise until tight (fig. 5). Repeat this step until all four connections are made.

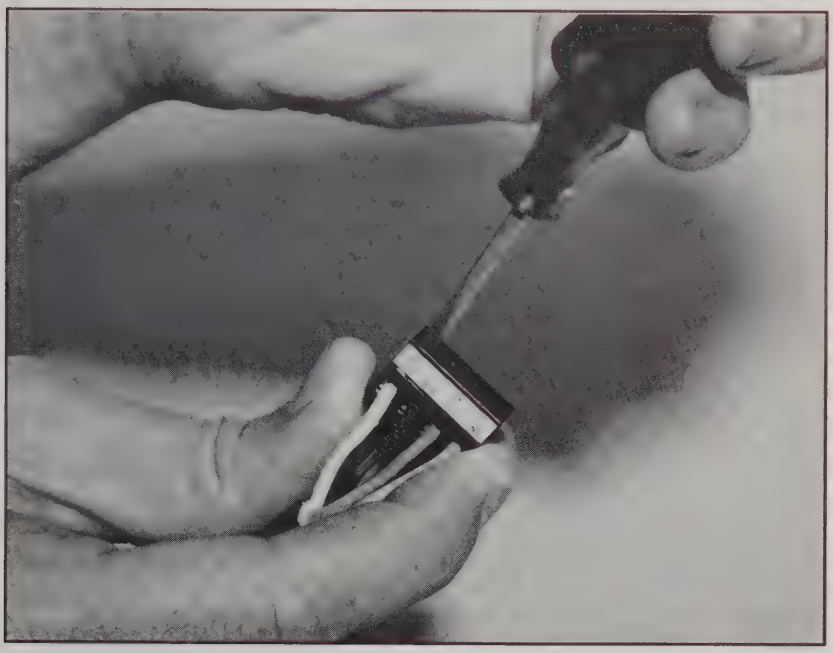

Figure 5. Inserting wire into the connector

6 Slide the cover over the connector until snug. This end of the cable will be connected to the Display/Power Supply (fig. 6).

7 Connect the other end of the cable according to the instructions for your transducer.

Figure 6. Assembled connector on a cable

Setting the readout scale

If you purchased your Display/Power Supply with a TSI transducer, the module is already configured to match the transducer's output. If you purchased the Display/Power Supply without a TSI transducer, you must configure the module to display the proper units.

To set the proper full-scale value, follow these 14 steps:

1 Remove the two screws on the bottom of the Display/Power Supply; this allows you to slide off the cover.

2 After you remove the cover, position the Display/Power Supply so that the display faces you, as shown in figure 7.

3 Switch on the module.

> *WARNING:* Do not remove the paper shield on the left side of the power supply. It protects you against hazardous line voltage.

4 Using figure 7, locate the three 8-position DIP switches.

- Each DIP switch has eight separate rocker switches and each rocker switch has two settings: *on* or *off*. Note that each rocker switch has a number at one end: Push the numbered side down to switch that position *on*; push the unnumbered side down to switch that position

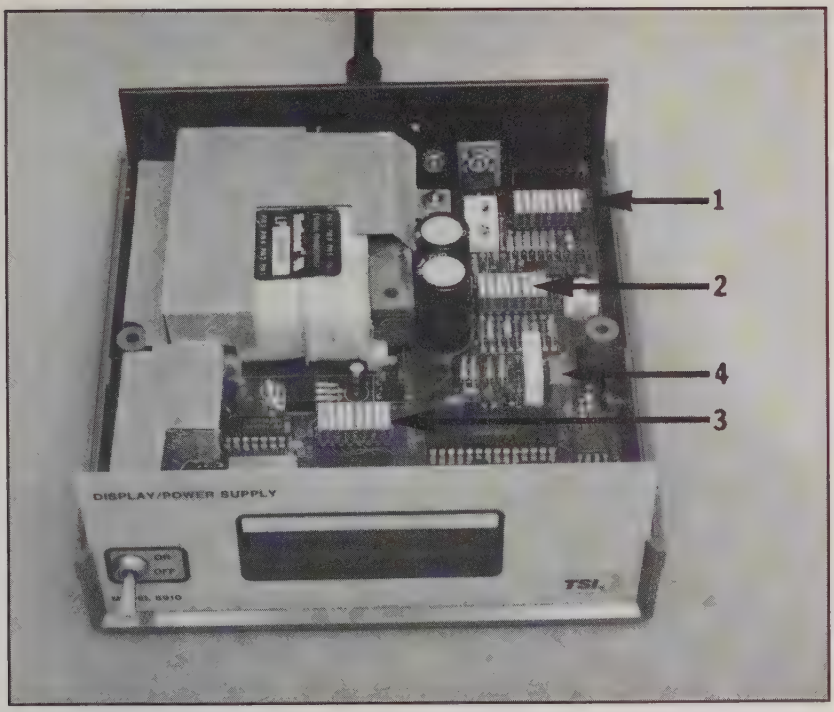

Figure 7. Display/Power Supply with cover removed

1. SW1
2. SW2
3. SW3
4. fine-scale adjustment potentiometer

off. In the drawings of the DIP switches, a black square close to a number indicates the *on* position; a black square away from a number indicates the *off* position.

To configure the module for the setup mode, locate the switch closest to the back panel (SW1) and set it according to figure 8.

Figure 8.
Settings of SW1 for the setup mode

5 Using figure 7, locate the DIP switch closest to the front panel (SW3). To light up all digits and turn off all decimal points, set SW3 according to figure 9.

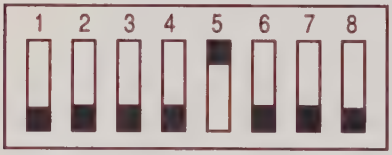

Figure 9.
Initial setting of SW3

6 Using figure 7, locate SW2. To set the rough scale, start by setting all eight positions to the *off* position (fig. 10). The display then flashes to indicate an overrange condition.

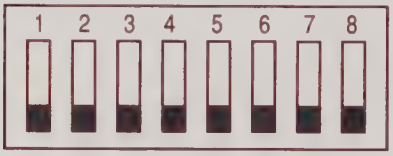

Figure 10.
Initial setting of SW2

7 Locate the fine-scale adjustment potentiometer in figure 7. With a small flat-blade screwdriver, turn it clockwise about 20 revolutions; this ensures that the adjustment is at one of its limits.

8 Determine the full-scale value you want to display. For example, if you want the display to read '500.0' feet per minute full-scale, first adjust the display to read 5000 and then set the decimal for digit 4, thus making the reading 500.0.

You can set the display to read full-scale values from 0.2000 to 19999. According to the table below, the first digit is either *off* or it is a '1'. If you need to truncate the digits, always drop off the least significant (rightmost) digit. Table 2 lists sample full-scale settings.

Now begin setting SW2. Start with position No. 8 and work down to No. 1. As you activate each successive position, the displayed reading falls. Note that the positions are designed so that No. 8 has the largest effect on the displayed reading; No. 7 has one-half the effect; No. 6 has one-fourth the effect; No. 5 has one-eighth the effect, and so on. The

TABLE 2. Examples of full-scale settings

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Sample readout
	.2	0	0	0	0.2000 SLPM*
	.7	5	0	0	0.7500 SCFM**
1	.0	0	0	off	1.000 SLPM
1	5	.0	0	off	15.00 SFPM†
	4	1	2	.0	412.0 lb/min
1	2	5	0	off	1250 SFPM
1	9	9	9	9	19999 SFPM

*SLPM = standard liters per minute
**SCFM = standard cubic feet per minute
†SFPM = standard feet per minute

object is to turn on the positions one by one until the displayed reading falls *below* the desired value. At that point, turn off the position you just turned on so that the reading climbs back above the desired value. Skip over that position and move down to the next one. In this way you bring the reading closer and closer to the desired value, until you reach a value that is just slightly *higher* than the value you desire. When you can get no closer to the desired value with the DIP switch, use the fine-scale adjustment potentiometer (fig. 7); turn it counterclockwise until the display reads the desired value exactly.

For example, if 500.0 feet per minute were the desired value, the setup sequence would proceed as shown in table 3.

However, you may wish to set up a full-scale value much closer to the maximum of 19999 than our example here (5000). If so, setting SW2-8 alone to the *on* position may result in a reading lower than required. If this happens, set SW2-8 to the *off* position; then set SW2-7 to the *on* position and then set SW2-6 likewise. If the reading is still too low, set SW2-6 to the *off* position and set SW2-5 to the *on* position (SW2-7 and SW2-5 are the only ones in the *on* position). If the reading is now higher than the desired value, proceed as explained generally in Table 3: set SW2-4 to the *on* position, leave it in that position and then set SW2-3 to the *on* position, etc., until you are just above your desired value. Finally, use the fine-scale adjustment potentiometer to achieve your desired value.

TABLE 3. Sample setup sequence

What the display reads	What you must do
0000 (flashing)	Display is overrange. Set SW2-8 to the *on* position.
16481	Reads high. Set SW2-7 to the *on* position.
10325	Still high. Set SW2-6 to the *on* position.
6423	Still high. Set SW2-5 to the *on* position.
4207	The display reads low. Set SW2-5 to the *off* position.
6423	Reads high again. Set SW2-4 to the *on* position
5333	Still high. Set SW2-3 to the *on* position.
4776	Reads low. Return SW2-3 to the *off* position.
5333	Reads high again. Set SW2-2 to the *on* position.
5049	Still high. Set SW2-1 to the *on* position.
4909	Reads low. Return SW2-1 to the *off* position.
5049	Reads high again. Since SW2 can bring the value no closer without falling below 5000, use the fine-scale adjustment potentiometer to set the value to '5000' exactly.
5000	Reads exactly 5000. The adjustments are now complete. Next, insert the decimal point.

- ✦ If you want to establish a full-scale value of 19999, set SW2-7 and SW2-5 to the *on* position. Turn the fine-scale adjustment potentiometer counterclockwise until the flashing zeroes stop. Now use the potentiometer to fine-tune the reading to achieve the desired value of 19999.

  If you use 19999 as a full-scale setting, any signal from the transducer that exceeds 5 volts DC or 20 milliamperes will cause an overrange (flashing zeroes).

9 You can activate and deactivate the decimal points by using SW3, Nos. 1, 2, 3, or 4. Do not activate more than one decimal at a time or you will switch off an entire digit.

In our example of '500.0', you must set the decimal point in the reading of '5000'. Using only SW3, individually set SW3-1 through SW3-4 to the *on* position and then to the *off* position until the second decimal point lights.

10 If you want to switch off digit 5 (rightmost digit), set SW3-5 to the *off* position.

11 You must now reset SW1 (the DIP switch closest to the back panel) to the operating mode, according to the specific type of input. Refer to the next section, Setting DIP switches to match the input signal for the procedure.

12 Included with the Display / Power Supply is a sheet of plastic, perforated labels that allows you to designate the measurement units you are using. Simply tear off the appropriate strip from the sheet and slide it into the slot at the side of the front panel so that the units appear in the clear window above the LED display (fig. 11). If the units you are using are not included on the sheet, make your own label with one of the blank strips and a permanent marker.

13 Slide the cover back onto the Display / Power Supply; take care not to damage the end of the units label which may extend slightly beyond the panel edge. Since the cover has a slot on one side and a groove on the other, it fits on the housing only one way.

14 To secure the cover to the housing, reinstall the two screws into the screw holes on the bottom of the housing.

The Display / Power Supply is now ready for operation.

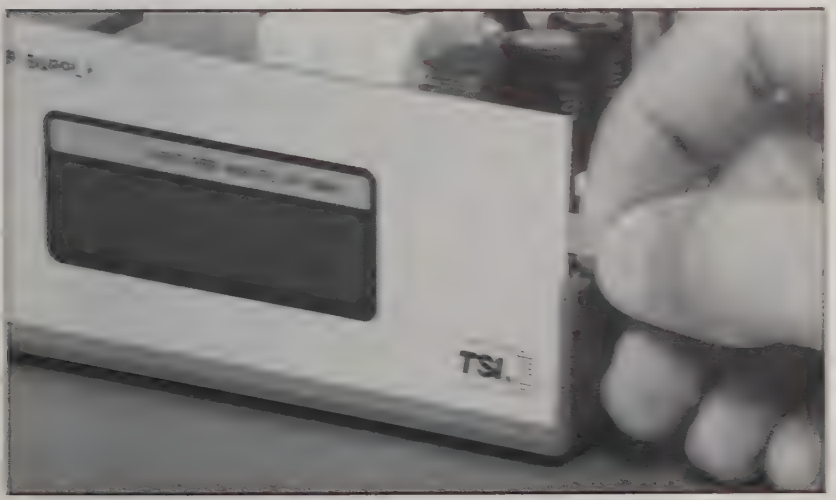

Figure 11 Inserting a measurement units label into the display

Setting DIP switches to match the input signal

The Display/Power Supply accepts input signals of either 0 to 5 volts DC or 4 to 20 milliamperes. To make the internal adjustments for your transducer, follow these three steps:

1 Remove the two screws from the bottom of the Display/Power Supply and slide off the cover.

2 Position the module so that the display faces you.

3 Locate the DIP switch closest to the back panel (SW1, fig. 7). If you are using the module with an input of 0 to 5 volts DC, set SW1 as shown in figure 12.

Figure 12.
SW1 set for 0-to-5-volt DC operating mode (as set at the factory when purchased without a TSI transsducer)

If you are using the Display/Power Supply with an input of 4 to 20 milliamperes, set SW1 as shown in figure 13.

Figure 13.
SW1 set for 4-to-20-milliampere operating mode

The Display/Power Supply is now ready for operation. Proceed to chapter 2. ■

Chapter 2
Operation

If you purchased a TSI velocity transducer or mass flowmeter with the Display/Power Supply, the module has already been configured at the factory. If you did not purchase a TSI transducer or mass flowmeter with the module, you must configure the module before operation for the appropriate readout scale and type of signal input; refer to chapter 1.

> *Caution:* Before you plug the instrument into an AC outlet, make sure the Voltage Select switch on the back panel indicates the line voltage at which you are operating.

Switching the Display/Power Supply on and off

First, switch on the module. The display shows the output of the transducer that you have connected to the Display/Power Supply. The measurement units above the display should reflect the units that the module has been set to read. Be sure to switch off the module when not in use.

Reading the display

The display reads out the transducer's output. No adjustments are necessary.

The Display/Power Supply is designed to accept signals from your transducer that exceed the full-scale range and to display a proportional linearized value. This means that you may see readings above the full-scale setting if the condition you are measuring exceeds the full-scale range of the transducer. In the milliampere signal mode, the maximum acceptable signal is limited to 21 milliamperes. In the voltage mode, however, the maximum signal is limited to a voltage that would display a value of 19999 (the maximum value allowed by the readout).

- Once your module has been properly set up, a flashing display occurs only when the output from your transducer forces the readout to try to display values above 19999, the maximum value available.

Chapter 3

Maintenance and Troubleshooting

The design of the Display/Power Supply makes the instrument maintenance-free.

Troubleshooting

Table 4 lists the symptoms, possible causes, and recommended solutions for common problems encountered with the Display/Power Supply. If your symptom is not listed, or if none of the solutions solves your problem, please contact TSI.

TABLE 4. Troubleshooting the Display/Power Supply

Symptom	Possible causes	Solution
No display	No line voltage	Check that the module is plugged into a source of 105–125 volts AC or 210–250 volts AC and that the outlet is live.
	Burned-out fuse	To check the fuse, you must take out the fuseholder. Insert a flatblade screwdriver into the slotted fuseholder; push the fuseholder in and turn counterclockwise. Burned-out fuses are caused by (1) an improperly sized fuse (for 115 volts AC, use a 0.125A fuse; for 220 volts AC, use a 0.063A fuse); (2) incorrectly set line-voltage; (3) a shorted output cable from the power supply.

(continued)

TABLE 4. Troubleshooting the Display/Power Supply (continued)

Symptom	Possible causes	Solution
Display does not read the expected value	Misadjusted scale setting	Check the display's scaling procedure in ch. 1, *Setting the readout scale.*
	Loose or incorrect cable connections to the transducer	Check that the connections of the transducer cable are tight and correct.
	Transducer needs recalibration or cleaning	Refer to your transducer's operating and service manual for specific instructions.
Flashing display	Meter overranging (the signal from the transducer is forcing the readout to try to exceed a value of 19999, the maximum available value).	Make sure the condition being measured is not beyond the transducer's range.

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